

At-Risk Stock Restoration Initiatives in Washington

Introduction

In 1992, the Washington Department of Fisheries and Wildlife and the Western Washington Treaty Indian Tribes developed the Washington State Salmon and Steelhead Stock Inventory (SASSI), which documents the results of a stock status inventory (WDF et al. 1993). This is seen as a first step in maintaining and restoring wild salmon and steelhead in Washington. In SASSI, the majority (67%) of pink (*Oncorhynchus gorbuscha*) and chum salmon (*O. keta*) stocks in Washington are considered to be "healthy", with 9 stocks (10%) designated as "depressed" or in "critical" condition (Figure 1). Critical stocks include Lower Dungeness River and Elwha River pinks and Discovery Bay and Hood Canal summer chum salmon (Figure 2). Possible reasons for the decline of these stocks include habitat degradation and urbanization, predation and/or competition by hatchery and wild salmonids, overfishing, and unfavorable ocean conditions.

State-wide Restoration Initiatives

In the majority of cases, state-wide restoration initiatives are in the planning stage. Cooperative studies are to begin shortly on the Lower and Upper Dungeness River pink salmon (R. Wunderlich, USFWS, personal communication), spawning ground enhancement projects are to begin on the Grays River and Hamilton Creek springs (G. Johnson, WDFW, personal communication), and memorandums of understandings (MOUs) are being written with rehabilitation measures for Sequim Bay, Discovery Bay, and Hood Canal summer chum salmon. In the MOU between PNPTC, WDFW, and the USFWS on Hood Canal summer chum, the parties have agreed to develop plans (interim and long term) by June 30, 1995. The plans will include escapement goals, harvest management restrictions, supplementation strategies, and tasks to be addressed.

Hood Canal Summer Chum Salmon

Hood Canal is an inland fjord of Puget Sound and is host to a number of anadromous salmonid species including chum salmon, coho salmon (*O. kisutch*), chinook salmon (*O. tshawytscha*), coastal cutthroat trout (*O. clarki*), steelhead (*O. mykiss*), pink salmon, Dolly Varden charr (*Salvelinus malma*), and some stray sockeye salmon (*O. nerka*) (Schreiner et al. 1977). Summer chum salmon returns to Hood Canal drainages have declined dramatically since 1968 and have reached critically low levels in recent years (1979-1993). Combined annual Hood Canal summer chum returns now constitute less than three percent of their former abundance (Figure 3). Of the 12 streams that have produced summer chum salmon in Hood Canal, only seven have had recent returns. This decline in abundance prompted a petition to the National Marine Fisheries Service to list Hood Canal summer chum salmon as threatened or endangered and to designate critical habitat under the Endangered Species Act (PRO-Salmon 1994). Possible causes of the decline in abundance of summer chum salmon include: freshwater and estuarine habitat loss and degradation; non-point pollution; hatchery fall chum interactions; estuarine predator-prey relations; overharvest in coho and chinook salmon terminal fisheries; overharvest in marine mixed stock fisheries; and general changes in oceanic and estuarine conditions.

Big Quilcene River Summer Chum

The Big Quilcene River (WRIA 17.0012) is 30.4 km long and is accessible to anadromous salmonids for approximately 12.2 km (Williams et al. 1975). No tributaries to this river are accessible to salmonids. A dam at river km 12.3 diverts water to the City of Port Townsend and a paper mill. The diversion causes diminished flows in the lower stream reaches during September and early October. The Quilcene National Fish Hatchery is located at the mouth of Penny Creek (WRIA 17.0014) at river km 4.5. A hatchery electric fish barrier blocks anadromous salmonids from April to January. Gradients are steep in the upper watershed where extensive logging has taken place. Other land uses include farming, ranching, second growth forests, and residences. The town of Quilcene is located near the river mouth. The gradient becomes moderate in the lower 4.8 km and summer chum salmon have been known to spawn in the lower 4.4 km. Since 1968 summer chum salmon escapements have declined from 4,000 to approximately 100 (Figure 3)

In-river modification of the Big Quilcene River has been frequent. The Big Quilcene River was diked prior to 1970 between river km 3.2 and 4, resulting in scouring and loss of spawning gravel, and has been channelized recently within the lower kilometer. In the late 1970s, a 100 meter log jam was removed in summer chum spawning area under permit. In 1991, due to streambed aggradation, over 600 meters of dike construction and channel excavation legally took place subsequent to dewatering of the summer chum spawning reach. The latest channelization took place illegally in 1993, when dike reconstruction and channel work were performed on over 500 meters of the chum spawning reach, destroying 29% of the summer chum salmon redds (D. Zajac, personal communication).

In 1992, prior to the return of Big Quilcene River summer chum, the WDF, PNPTC, and USFWS-WWFRO agreed to establish and implement management actions directed at protecting Quilcene Bay summer chum salmon (WWFRO 1992). These actions included reducing fishing effort, modifying gear and limiting areas open for coho fisheries to reduce incidental take of summer chum salmon, and supplementing natural spawning with an enhancement program at QNFH. A small-scale supplementation program on the Lilliwaup River also began in 1992.

Quilcene National Fish Hatchery Summer Chum Program

The joint interim agreement regarding the run restoration program at QNFH addressed the following: (1) the program is an emergency cooperative effort to attempt to rebuild the run from the existing low level, with the generally much higher egg-to-fry survival in a hatchery setting than in the wild (Figure 4), while preserving the run's genetic character; (2) the program would potentially need to continue through three generations to succeed (12 years); (3) brood stock would be captured from the natural stock in the Big Quilcene River and in Quilcene Bay; (4) Hatchery brood capture should not remove more than 50% of adult in-river returns; (5) all brood stock would be sampled for GSI, scales, other biological characters, and for disease assessment; (6) the egg bank goal would be 400,000; and (7) resulting hatchery fry would be released into the Big Quilcene River.

Broodstock were captured in the Big Quilcene River with gill nets and by snorkelers, and in Quilcene Bay with beach seines and set nets. Two hundred and twenty-four males and 188 females were captured in 1992, 18 males and 17 females in 1993, and 298 males and females in 1994 (Table 1). The estimated percent of spawners used in the hatchery program has ranged from 28 to 56%. A total of 216,441 fed fry were released in April, 1993 into Quilcene Bay, 24,784 in April, 1994, and approximately 375,000- 1993 brood year fry are currently in the hatchery. This program was immensely important in 1993, when, as mentioned earlier, a major portion of the Big Quilcene River containing summer chum redds was destroyed by winter flooding and subsequent channel stabilization and bulldozing.

A proportion of the released fry have been coded-wire-tagged for future evaluation, and weekly chum fry surveys have been completed in Quilcene Bay in March and April of 1993 and 1994. The interim agreement between the tribes, state, and federal agencies call for the QNFH summer chum program to continue for 12 years (3 brood cycles). It is hoped that the major causes of excess summer chum salmon mortality can be identified and corrected during this time. Information gathered from this program, such as the importance of the use of hatcheries, will be used in future restoration efforts.

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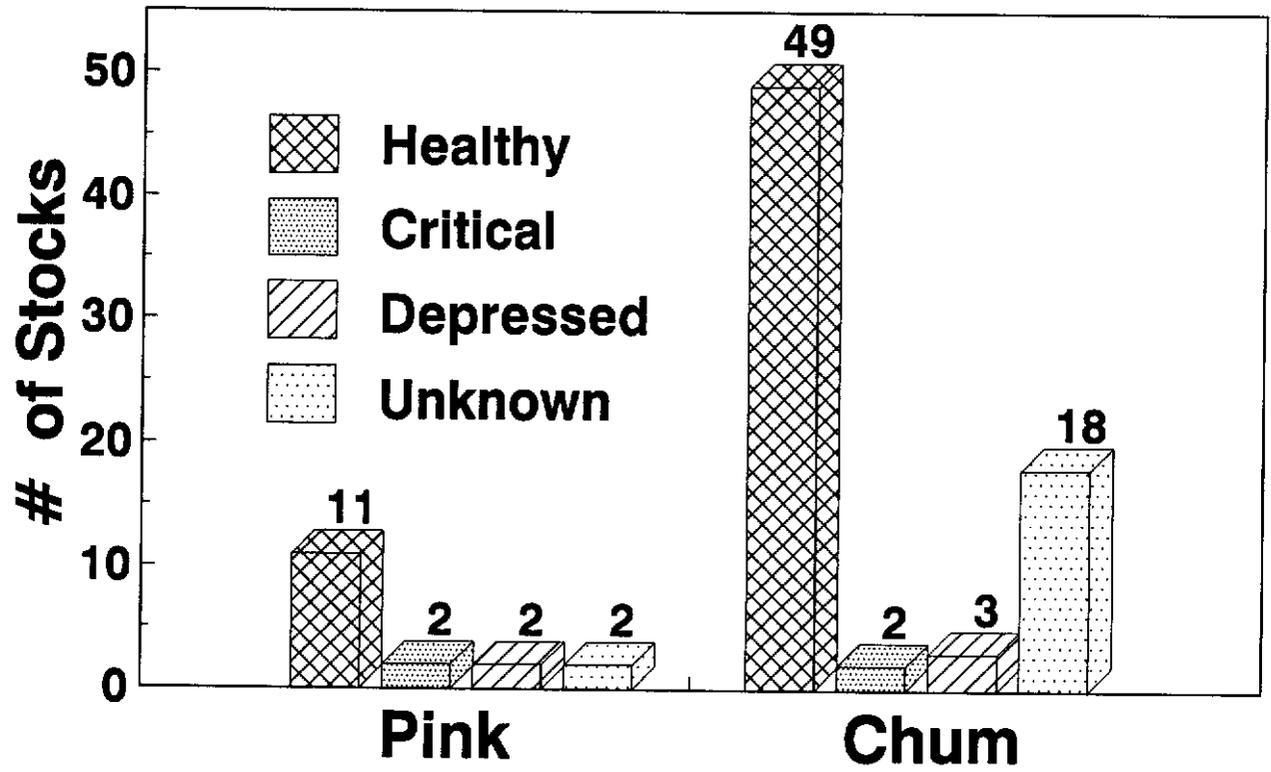


Figure 1. Pink and chum salmon stocks in Washington as designated in SASSI (WDF et al. 1993).

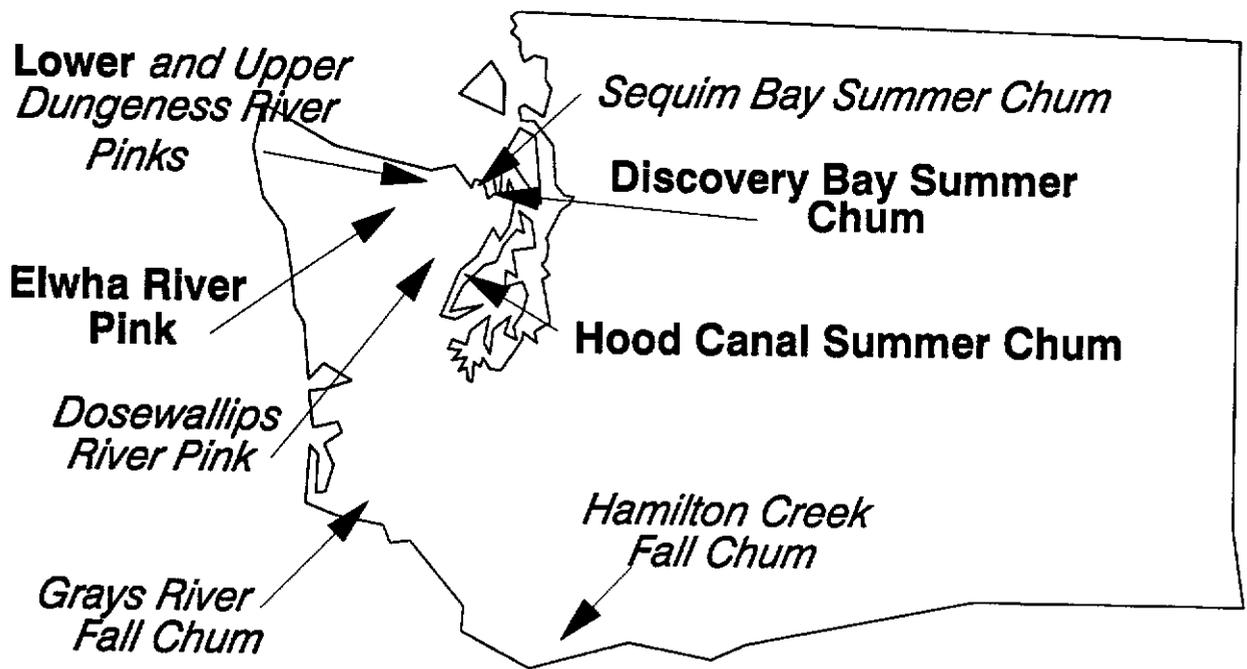


Figure 2. Critical and depressed pink and chum salmon stocks in Washington (WDF et al. 1993). Boldface stocks have been designated as critical.

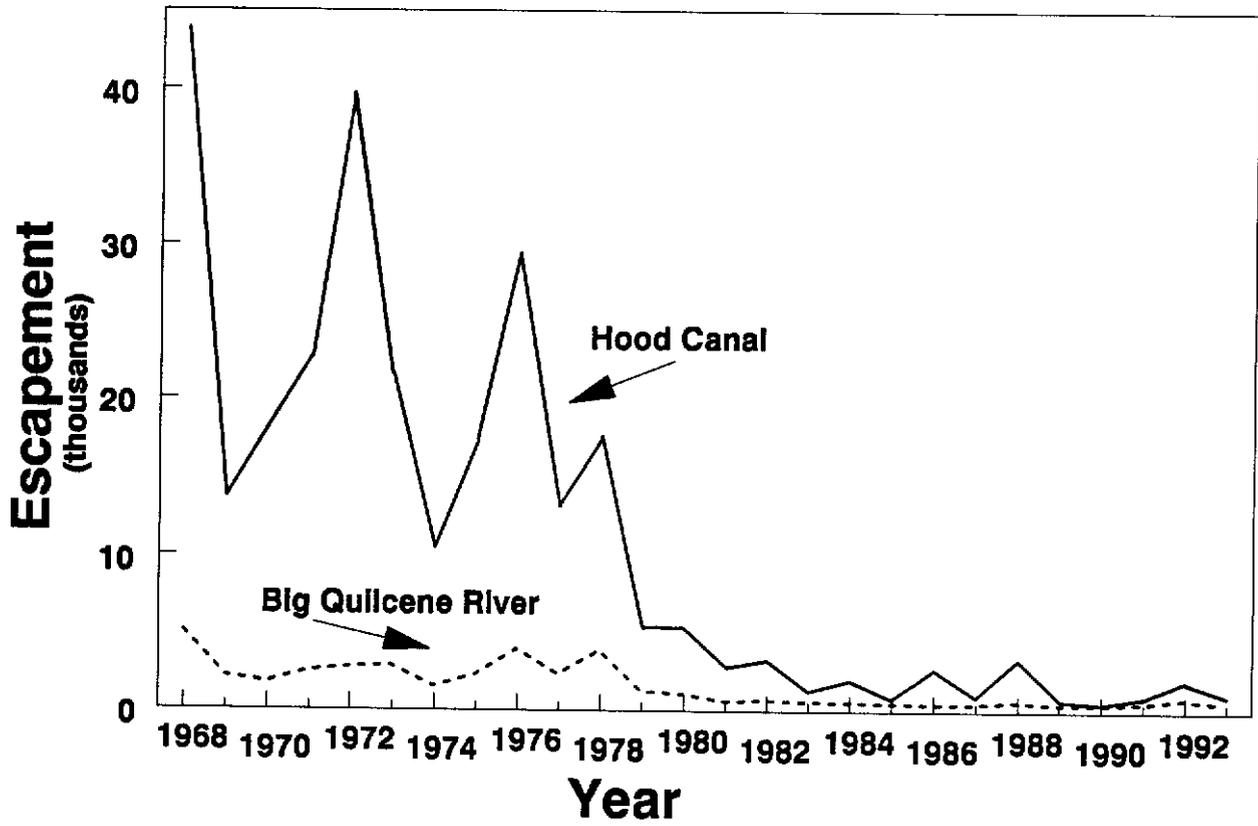


Figure 3. Total Hood Canal and Big Quilcene River summer chum salmon escapement from 1968 to present (WDFW, unpublished data).

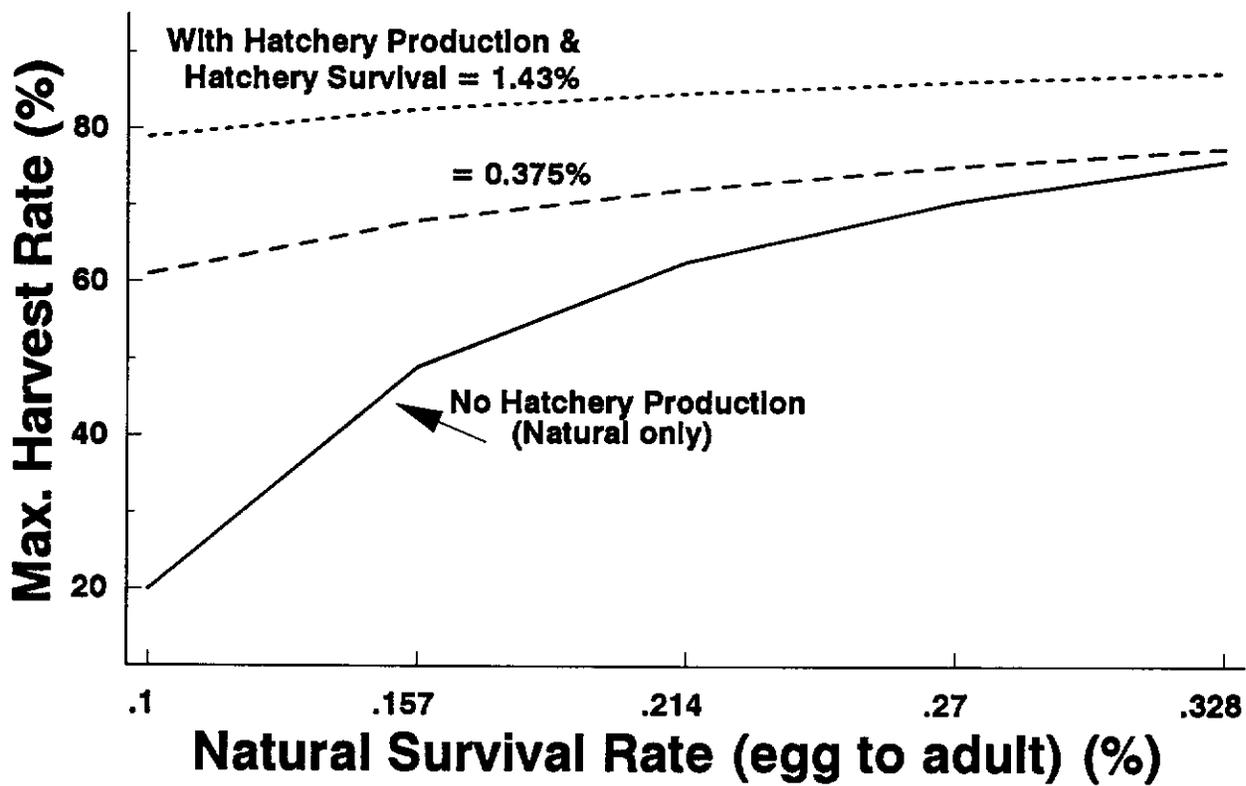


Figure 4. Harvest Rates sustainable with or without hatchery production. Hatchery production assumes a higher egg-to-fry survival than found in the wild).

	Spawnd at QNFH	In-River Escapement	% at QNFH	# of Fry Released
1992	412	330	56	216,441
1993	35	89	28	25,000
1994	298	326	48	375,000*
Total	745	745	50	616,441

* Currently held at QNFH.

Table 1. Numbers spawned at QNFH, fry released, and estimates of in-river escapement of summer chum salmon.

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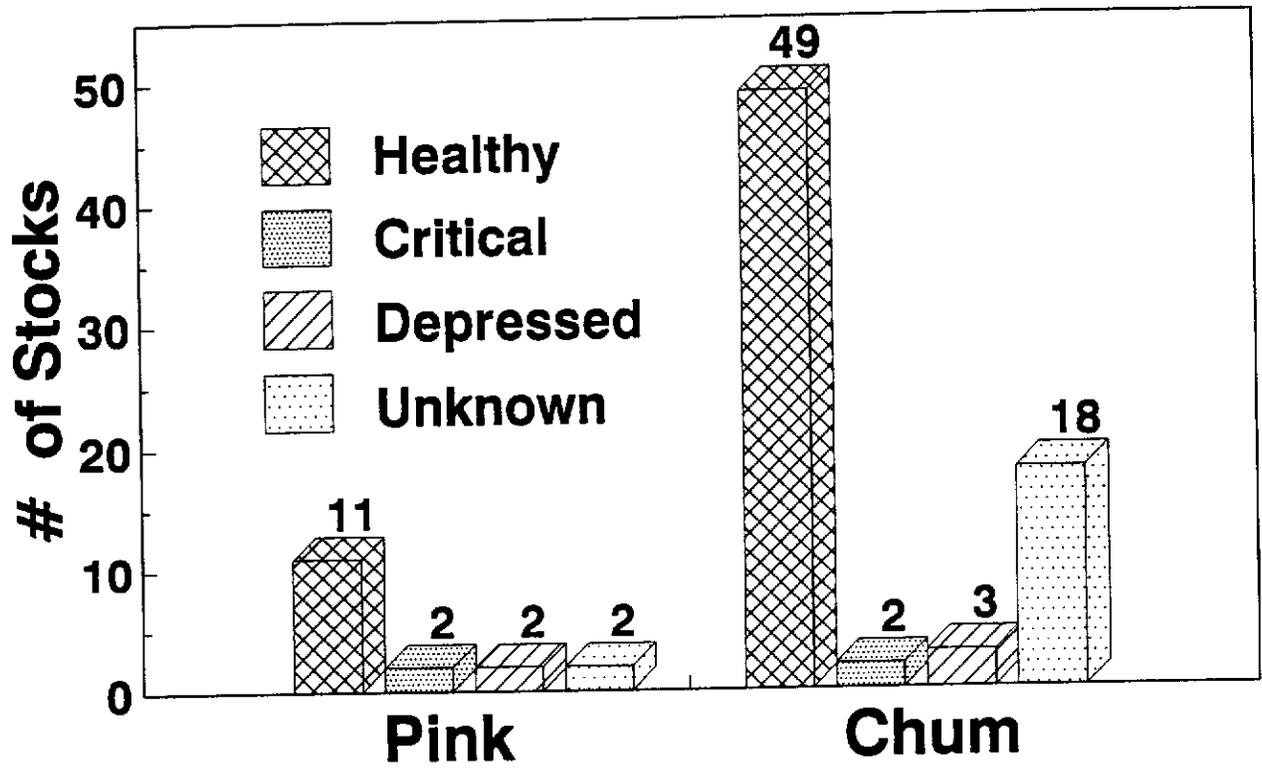


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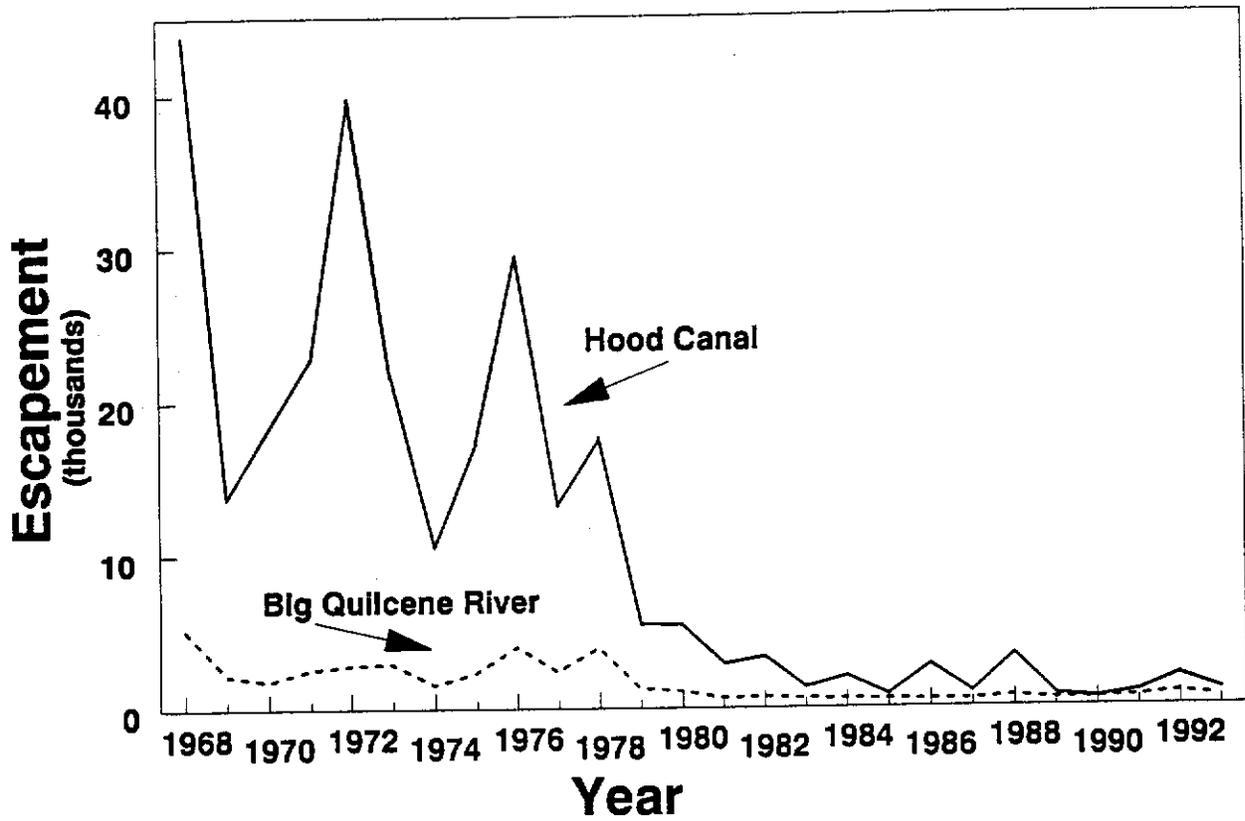


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